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Because of the rapid development of the study of the superfamily Oribatoidea, and the cost of figures, it has become necessary to name and describe some of these species in much more condensed form than has been my ideal. I have on file, however, a set of detailed sketches of these species, and will retain the types until opportunity presents itself to complete the descriptions. Lots, the numbers of which bear a capital F, are to be deposited at the National Museum, otherwise at the Museum of Comparative Zoölogy.

After a careful study of certain genera which include a holarctic species, I find that in holarctic species the notogastral bristles tend to occupy the same relative positions in each of the subspecies while subspecific differences occur in the modification of chitinous ridges or expanses, that is, the position of the bristles is more stable than the development of the chitinous ridges and spurs. Examples are *Tectocepheus velatus* and *Oppia corrugata* (see below).

Trhypochthonius silvestris sp. nov.

Differs from *T. americanus* (11) in that the pseudostigmatic organ head and the notogastral bristles are pointed, not blunt; and that bristles a1 are minute and simple; other bristles of notogastral disc short but barbed or bristled.

Cotypes: Thirty specimens from litter of isolated short-leaf pine stand two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F15.2.

Nothrus silvestris (22, p. 458, Pl. 7, Figs. 4)

The following American specimens are identical with those from Regensburg: One specimen from cushion moss, upland swamp, East Village, Monroe, Conn.; taken March 23, 1919, slide 1913n4. Two specimens from grey-green moss on rock, upland

swamp woods, East Village; taken August 25, 1925, slide 2531n1. Six specimens from hemlock leaf mould, hill above state road, gorge, Sandy Hook, Conn.; taken June 24, 1926, slide 2613n1.

Nothrus terminalis carolinae subsp. nov.

DIAGNOSTIC CHARACTERS: Differs from the species (2, p. 10, Pl. 1, Fig. 8) from Austin, Texas, in having abdomen more sharply rounded behind; bristles e3 more distant from f2; rostral bristles short, pointed; lamellar bristles much larger, clavate.

DESCRIPTION: Abdomen with deep, narrow, dorsal groove distant from edge about twice its width, four bristles along lateral edge, the second (b3) inserted on transverse plane slightly anterior to c1, the third (d3) inserted on transverse plane slightly posteriad of d1; e1 as approximate as a1, subequally distant from d1 as d1 is from c1, directed mesad and usually crossing near distal end; e2 between e1 and f2 but nearer f2; the humeral bristle is a3; a2 shorter than the others; altogether there are 13 bristles visible in dorsal aspect and two in ventral aspect (inserted on edge of notogaster), all these bristles as well as lamellar and interlamellar are smooth edged but have a couple of fine longitudinal lines; pseudostigmatic organs closely barbed.

COTYPES: Thirteen and fifteen specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slides 34F11C1 and -C2.

Nothrus monodactylus comb. nov.

Nothrus anauniensis monodactylus (8, p. 381) from Columbia, Mo., is closely related to the above, possibly synonymous. It cannot be redetermined until material from the type locality and type habitat is studied.

Camisia spinifer (Koch)

Specimens from the Asheville basin (N. C.) are identical with specimens from Regensburg. They differ from the figures of Michael (21, vol. 2, Pl. 48, Figs. 7–13) in that the rostral bristles have very short apophyses, the apophyses of the lamellar bristles are as long as the body of the large posterior apophyses, and that the posterior pair of mesal bristles (that is bristles a5) are lacking. Although Michael shows a bristle laterad of the second mesal pair (a2), I believe these to be the distal ends of b1 recurved to that position. Neither Nicolet (22) or Willmann (29, p. 110, Fig. 62) show such and none such occur in Regensburg specimens. Finally the specimens from western North Carolina have much longer bristles than figured by European Acarologists

and they are very irregularly roughened by barbules, thorns and minute apophyses (in caustic-potash cleaned specimens). These asperities may be identical with what Michael calls "villous processes."

If Michael's figures are accurate the English Islands may be endowed with a distinct, insular subspecies. Fortunately the continent of North America (at least in the east) will not force a trinomial on our already burdensome nomenclature. *Pseudotritia ardua* and *Northus silvestris* are the only other species known to me to lack subspecific differentiation from the European.

Camisia spinifer, in life, is very grimy, the dorsal bristles being so intersmeared as to give the dorsum the appearance of a rectangular basket, the bristles being the withes from which the basket is woven. My wife and I always refer to it as "The Basket Nothrus."

Genus Belba (14a, p. 611)

Resembling Damaeus but with tectopedia II not developed laterad of insertion of legs I, thus without auricles between legs I and II.

Type: *Notaspis corynopus* (14, p. 89, Pl. 4, Fig. 2).

Belba olitor sp. nov.

Body pulverulent; legs moniliform; cephaloprothorax nearly as wide as abdomen; pseudostigmatic organs very long, flagelliform; lamellar bristles similar to rostral, inserted just above them; exopseudostigmal bristles and interlamellar bristles fairly long, flagelliform, the latter inserted quite close to pseudostigmata; posterior edge of cephaloprothorax with cornicles; notogaster semiglobular, with eighteen rather stout, black, slightly curved bristles forming a crescent of nine bristles on each side, the anterior pair inserted rather close together, the fifth pair inserted on longitudinal plane passing slightly mesad of the fourth and sixth, the ninth pair much more slender, elongate, flagelliform, on posterior margin two additional pairs of slender flagelliform bristles, subequally spaced laterad of ninth pair, spines (of anterior edge) long, curved, slender; genital and anal apertures subequal, separated by a narrow arm of ventral plate; tibia, genual, and femora IV each with a fairly long flagelliform bristle.

Cotypes: Eight specimens from twenty-year old-field of Andropogon and twelve-year-old pines, Cook property, Avers Creek Township, Buncombe Co., N. C.; taken February 19, 1935, slide 34F25.2–4.

This species is usually found with nymphal notogasters piled on its back. These skins are net-reticulate and have longer bristles than the adults.

Gymnodamaeus quadricaudiculus sp. nov.

Resembles *G. austriacus* (30, p. 334, Figs. 17–19) in the caudal appendage of the notogaster but in the American species the notogaster terminates in four, small, circular nubbins each bearing a stout, curved bristle; pseudostigmatic organs slenderly clavate, fairly long, the head studded with a plush of spikes; notogaster sculptured with an oval ridge from which there radiates six spurs or rays, one extending anteriad, one posteriad, and two laterad (each side); dimensions: length of body 0.4 mm.; breadth of notogaster 0.23 mm., length of notogaster 0.28 mm.

COTYPES: Fifty to sixty specimens from Andropogon sod, Glen Bald, Bent Creek Experimental Forest, Buncombe Co., N. C.; taken April 17, 1925, slides 34F31n1 to -n3.

Genus **Oppiella** gen. nov.

CHARACTERS: Differs from Oppia in that the notogaster is moderately arched, often with anterior band more or less raised as a ridge, bearing eighteen bristles, often with an additional pair on anterior peripheral band; sides of thorax above legs II and III usually smooth or with a few low ridges; cephaloprothorax often with conspicuous knobs or/and ridges; tectopedia II variously developed.

TYPE: *Dameosoma corrugatum* (5, p. 273; 24, p. 62, Pl. 4, Fig. 23).

In a recent paper (19) I recorded the type of Oppia as having pseudostigmata distant from anterior edge of notogaster. Since having written this statement I have secured specimens of *Oppia nitens* from the type locality and type habitat; under bushes in gardens, Regensburg, and find that the pseudostigmata are close to the anterior edge of the notogaster. Thus Dameosoma is a synonym of Oppia. *Dameosoma ultraciliata* (19, p. 19, Figs. 16–22) and *D. alces* (19, p. 23, Figs. 154–158) thus become *Oppia ultraciliata* **comb. nov.** and *Oppia alces* **comb. nov.** respectively. In the same paper *Phauloppia bryani* should be *Eporibatula bryani* **comb. nov.**

Oppiella corrugata comb. nov.

This species has recently been referred to as *Oppia neerlandica* (29, p. 128, Fig. 132). I am unable to see any relation between Oudemans' figure of his

Eremæus neerlandicus (23, p. 168, Fig. 4) and that by Paoli (24, Pl. 4, Fig. 23) and by Warburton and Pearce (28, p. 567, Pl. 20, Fig. 2). especially as I have found Oudemans' figures to be quite accurate. This species is represented in the eastern United States by the following forms:

Oppiella corrugata apicalis subsp. nov.

(Figures 3–7)

As the species but sides of ridge along anterior edge of notogaster more nearly parallel and the bristle inserted at posterior bend of the ridge (Figure 3). For contrast I have included a figure of this area from specimens coming from Regensburg (Figure 1). The position of the other notogastral bristles is identical with the Regensburg specimens. They are figured as quite differently situated by Paoli for Berlese's Florentine types. Moreover, the anterolateral projection of the notogaster (shoulder spur) is longer, more extended while it is short and blunt in Regensburg specimens. Size: large for the genus, but quite variable.

Cotypes: Thirty-one specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F120p3.

Nine specimens from Great Falls, Va.; taken May 19, 1914, by Nathan Banks, slides 26B104 and -b, are intermediate between this and the next form.

Oppiella corrugata squarrosa subsp. nov.

(Figure 2)

As the species but sides of ridge along anterior edge of notogaster quite parallel, forming a right angle at both anterior and posterior ends though the bristle is inserted anteriad of the posterior bend of the ridge (figure 2); other notogastral bristles as in the above; shoulder spur pointed, much as figured by Paoli for the Italian race (24, Pl. 4, Fig. 23); lamellæ often with strongly developed, fine, slender, cross-ridges; lamellar bristles (in heavily sclerotized individuals) inserted on a disclike expansion of distal end of lamellæ.

Material examined: Three specimens from decaying vegetation scraped from north side of *Carex stricta* tussock, upland swamp, East Village, Monroe, Conn.; taken August 7, 1925, slide 2513n1. Five specimens from dead, overhanging leaves, east side of tussock, same locality; taken August 10, 1925, slide 2514n3. One hundred five specimens from clump of sphagnum near above tussocks; taken August 18, 1925, slides 2520n2, 2521n7, -n8, -n9, 2522n5. The sample was sun dried, beginning

at 9 A. M. The container was emptied at 11:30, 4, and 6 P. M. yielding 5, 77 and 23 specimens respectively. One specimen from core cut from top of a *C. stricta* tussock, same locality; taken August 22, 1925, slide 2525n1. Nineteen specimens from decaying vegetation scraped from sides of a *C. stricta* tussock from open marsh (recently cut over), stream valley, northeast of East Village; taken August 28, 1925, slide 2533n2. Three specimens from old, decaying, wet grass from foot of old haystack on hillside, beyond above marsh; taken September 1, 1925, slide 2534n1. Sixty-two specimens from dead leaves in woods, edge of above upland swamp; taken September 9, 1925, slide 2538n1. Eight specimens from hemlock leaf mould, from hill above state road, gorge, Sandy Hook, Conn.; taken June 24, 1926, slide 2913n1. Six specimens from moss on and scrapings from old log, and leaf mould, below state road, gorge, Sandy Hook, Conn.; taken June 25, 1926, slide 2614n1. Fifteen specimens from leaf mould, old hemlock grove (with Polytrichum, Carpinus, and Fagus), west slope of Miamus Ravine, N. Y.-Conn.; taken in April, slides 26n1 and -h1.

One specimen from decaying leaves at base of clump of marsh sedge, Cliff Island, Casco Bay, Me.; taken September 14, 1925, slide 2539n3. Twenty-one specimens from sphagnum of cranberry bog, same locality; taken September 17, 1925, slides 2543n1, -n6, 2544n1, -n2, -n3. These specimens from the Maine coast have the ridge of anterior edge of notogaster less square than in Connecticut specimens but the shoulder spur is well developed.

One specimen from under a stone, South Salem, Ohio; taken May 1, 1924, (no. 212 and 213), slide 32M102 (Miller coll.).

HABITAT: Quite ubiquitous on decaying vegetation. Although not recovered from several moss samples, it seems to be common in sphagnum! This is the commonest species of the genus with general distribution, that is it has the highest frequency.

Oppiella foliosa sp. nov.

(Figures 9–12)

DIAGNOSTIC CHARACTERS: Bristles short, broad, clavate, blunt (figures 9 and 12); cephaloprothorax with raised ridges, simulating lamellæ and translamella, and others; notogaster with a pair of shoulder spurs and their

bristle; pseudostigmatic organ head stout, directed mesad; posterior end of abdomen strongly tapering.

Description: Size medium; total length 0.23 mm., breadth 0.115 mm.; color reddish brown; rostrum broad, with a pair of minute apicules each side of median plane; rostral bristles bent toward each other (figure 9); posterior edge of cephaloprothorax more densely sclerotized to base of pseudostigmata, sides of cephaloprothorax with a more densely sclerotized ridge running from base of pseudostigmata forward to transverse plane of apodemata I, narrowing and turning mesad (figure 9); lamellar and translamellar bands distinct on lateral and anterior edges only; a broad, distinct band (each side) passing from lateral ends of translamellar band anteriad nearly to insertions of rostral bristles; lamellar bristles inserted posteriad of base of these translamellorostral bands; interlamellar bristles inserted on transverse plane passing anteriad of anterior edge of pseudostigmata, on a very slender ridge which runs from slightly anteriad of insertion to posterior band; pseudostigmata distant from notogaster; pseudostigmatic organ pedicel strongly bent, head broad, either studded with short, close-set bristles clotted with foreign matter or having that appearance (figures 10); apodemata III broad, very conspicuous.

Notogaster broadly ovate, anterior end pointed; posterior end somewhat mammilate, sculptured with what has the appearance of fine, pale, irregularly longitudinal lines (figure 9, anterior area); bearing the usual eighteen bristles but in regular transverse rows (which I take to represent the primitive condition); the bristles are quite flat (figure 9, bristles d2), and somewhat veined (figure 12), except the posterior pair e1 which seem more clavate and shorter; spur bristles stout, pointed, barbed (figure 11). The spur bristle, which probably represents the true a1 or a2, is often of a different form than the other notogastral bristles.

Anal aperture close to posterior edge of plate; covers with bristles close to median edge; postanal bristles behind center of cover; pseudofissuræ well developed, lateral postanal bristles foliose, inserted anterolaterad of pseudofissura, preanal bristles slender, far anteriad of anal aperture, thus in this genus these last two bristles have migrated anteriad while in the pterogasterine genera they have migrated posteriad. Due to this great diversity in position my nomenclature becomes ambiguous and I will hereafter use that of Grandjean (13, p. 57) which is:

paramesal	ag1 (agenital)
preanal or paranal	ad1 (adanal)
lateral postanal	ad2
mesal postanal	ad3

This system has the additional advantage of being more concise, and there seems to be no question about the identity of these bristles throughout the Oribatidæ or of their homology.

Genital aperture small, anterior edge strongly angled; the four cover bristles widely segregated in two pairs; parasterna III–IV with two foliose

bristles, the lateral of III (on a more densely sclerotized band) and the mesal of IV inserted on its usual spur; sternum broad between apodemata I and camerostome, narrow posteriad (figure 9); parasterna I with lateral bristle foliose; apodemata I short.

HABITAT: Soil samples, Asheville basin.

COTYPES: Thirteen specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F13a0p3.

Oppiella stipularis sp. nov.

(Figures 13 and 14)

DIAGNOSTIC CHARACTERS: Bristles somewhat broad, tapering to a point, that is, resembling slender stipules (figure 13); cephaloprothorax with ridges as in *O. foliosa* but without translamellorostral pair; notogaster suboval; shoulder spur bristle minute; pseudostigmatic organ head pointed, bristled in two rows (figures 13 and 14).

DESCRIPTION: Size medium, total length 0.246 mm., breadth 0.115 mm.; color pale; shape slender; closely related to *O. foliosa* but a linear as to shape of body and bristles; rostrum broad; posterior band of cephaloprothorax not developed; lamellæ and translamellæ more definite; lateral bands more lateral (figure 13); pseudostigmata closer to notogaster; interlamellar bristle ridge extending further forward; lamellar bristles inserted on end of lamellæ.

Notogaster more elongate, anterior end truncate; bristles with a raised median ridge (figure 13, bristles d2), arranged in more strongly curved rows; a pseudofissura anterior to bristles b2 quite distinct, long; anal aperture extending laterad nearly to edge of ventral plate; anal pseudofissuræ shorter, at center of sides of aperture; bristles ad3 close to posterior edge of ventral plate, ad1 near edge of ventral plate; genital cover bristles 2 nearly posterior to bristles 1; sternum not as broad as in *O. foliosa;* apodemata I longer.

COTYPES: Three specimens from epigeous moss between Andropogon stools; closely browsed Andropogon pasture between wooded ridges, two miles southwest of Bent Creek on Asheville-Brevard road; slide 34F130p1.

It is not at present possible to state if this is a moss or a soil species.

Genus SUCTOBELBA (24, p. 72)

Oppias with mouth parts attenuated; mandibular chelae fine and slender; edge of camerostome variously modified but chiefly developed ventrad and divided by one or more incisions to form lobes or lacinia; lamellar bristles springing from a prominently

raised knob just anterior to plane of pseudostigmata; this lamellar knob appears triangular in dorsal aspect.

Type: *Suctobelba trigona* (Michael) Paoli (24, p. 74, Pl. 4, Fig. 31; Pl. 5, Fig. 50).

Several closely related American species may be segregated in the following genus:

Genus **Suctobelbella** gen. nov.

Suctobelbas with two pairs of spurs projecting from anterior edge of notogaster out over base of cephaloprothorax; anterior edge of notogaster between mesal spurs indistinct; rostral bristles usually ciliate-pectinate; notogastral bristles eighteen; bristles ag1 much nearer edge of ventral plate than to median plane; acetabulæ III projecting laterad of notogaster as an oblong lobe bearing a small colorless nubbin on anterior face.

Type: *Suctobelbella serratirostrum* sp. nov.

A study of the various locations of the notogastral bristles leads me to the conclusion that, at least in this genus, it is the five anterior bristles which are most restless. Referring to bristles of figure 8 as the typical, primitive condition, and disregarding the spur bristle (which may be a1 or a2), I regard the anteromesal pair of bristles as a1, the bristle posterolaterad of a1 as a2, the bristle posterior to a1 as b1, and that posterior to b1 as b2 which has shifted into the mesal series from its lateral position. In the genus Suctobelbella, bristles c2 are actively in the process of making this same change of position as will be noticed in the case of the following five species.

Suctobelbella serratirostrum sp. nov.

(Figures 16 to 20)

Diagnostic characters: Edge of camerostome cut by two (or three) incisions to form two or three lacinia (figure 17), pseudostigmatic organs clavate, bent, head ovate, distally attenuate, directed anteromesad, smooth, or with a few minute bristles, or the bristles irregularly arranged three or four abreast across the head, thus forming a brushlike structure (figures 16 and 20); notogastral bristles fairly long, fine, overlapping, a2 much closer to a1 than to b1, c2 only slightly more remote than b1, or b2, which are nearly in the same longitudinal plane (figure 16); ad2 on transverse plane passing through or slightly posteriad of anterior edge of anal aperture.

Description: Size medium (for the genus): length 0.2 to 0.21 mm., breadth 0.1 to 0.11 mm.; rostrum broad, not sharply demarked; rostral bristles standing out laterad as a grand moustachio; lacinia plainly visible in dorsal aspect

(figure 16), for shape of this area in anterodorsal aspect see figure 19; in posteroventral or anterodorsal aspects the lacinia seem to converge (figure 18); dorsal face of cephaloprothorax with the usual median, scallop-edged band and lateral bands enclosing a thinner area (figure 16); interpseudostigmatal ridges resembling an old English letter i, the interlamellar bristle inserted on the anterior end; behind the pseudostigmata a more densely sclerotized ridge with a posterior lobe passing under the shoulder spur.

Notogaster broadly oval, posterior edge cut away (lower half of figure 16); spurs subequal; bristles a1 more remote than lateral spurs! Posterior edge of anal aperture strongly angled; sides strongly converging (anteriad); anterior pair of cover bristles much more remote than posterior pair; bristles ad3 slightly more remote than breadth of anal aperture, nearly on same transverse plane as posterior cover bristles (figure 16); ad2 midway between edge of ventral plate and anal aperture; anterior edge of genital aperture gently curved; cover bristles 2 and 3 not very distant, the four bristles forming a very gentle curve; sternum anterior to genital aperture quite broad; apodemata II–III interrupted.

The smaller individuals have fewer bristles on the pseudostigmatic organ head. The appearance of the edge of the camerostome varies much according to angle at which it is seen.

COTYPES: One hundred and fifty-four specimens from Andropogon litter of a twenty year old-field grown to ten year old pines, Cook property, Avers Creek Township on Asheville-Brevard road, N. C.; taken February 25th, 1935, slides 34F25.3–5, –6 and –8. Large size from types.

Suctobelbella frothinghami sp. nov.

(Figures 23 to 25)

DIAGNOSTIC CHARACTERS: Rostrum extended anterolaterad as right angled corners (figure 23); this angle is formed by the centering of the distal end of the three lacinia of the edge of the camerostome at a common point; pseudostigmatic organ pedicel only slightly if at all bent below head, head oval to ovate, smooth, much shorter than pedicel (figures 23 and 24); notogastral bristles quite long (figure 23), bristles a2 on transverse plane passing nearer b1 than a1, c2 more remote than c1.

DESCRIPTION: Size large (for the genus, total length 0.246 mm., breadth 0.135 mm.; cephaloprothorax (figure 23) typical for the group except shape of rostrum; in lateral aspect (figure 25) edge of camerostome is seen to be produced ventrad as a point, above which are the reduced incisions, and fused lacinia, dorsoposteriad of which is a large thinly sclerotized reniform area; dorsal face of cephaloprothorax with the usual median, and lateral scallop-edged bands enclosing a thinner area (figure 23); pseudostigmata with a large posterior lobe which extends under the shoulder spur; interpseudostigmatic ridges bilobed, with well-developed connective which passes over

base of lamellar knob, interlamellar bristles inserted on anterior of the two lobes.

Notogaster, in dorsal aspect, nearly circular; median spurs broad, blunt; acetabulæ III very broad; notogastral bristles widely overlapping when depressed, bristles a1 posteriad of lateral spur, not distant from it, a2 nearer b1 than to a1, c2 more remote than a1, b1, or b2 which are in the same longitudinal plane (figure 23). Anal pseudofissuræ long; bristles ad2 inserted on transverse plane posterior to anterior edge of anal aperture, and near edge of ventral plate; genital covers with bristles 3 more remote than 2; parasterna III–IV with median bristle not as distant from the posterior bristle as greatest width of a genital cover.

HABITAT: Typically a species of deciduous woodland litter.

COTYPES: Thirty-seven specimens from litter of isolated shortleaf pine stand, two miles southwest of Bent Creek, on Asheville-Brevard road, N. C.; slide 34F10.20p1.

Named for Earl Hazeltine Frothingham, Senior Silviculturist at the Appalachian Forest Experiment Station.

Suctobelbella longicuspis sp. nov.

(Figures 21 and 22)

Similar to *S. frothinghami* but smaller (0.2 by 0.1 mm.); anterolateral corner of edge of camerostome drawn out into a fairly long lacinia, curved anteriad (figure 21), behind which are three subequal, much shorter lacinia, these lacinia separated by slender incisions, rounded at dorsal end, the proximal tooth merging into body of camerostome edge (figure 21); in dorsal aspect the long curved anterior lacinia is seen projecting each side of rostrum; pseudostigmatic organ head directed mesad, obliquely truncate (figure 22), side tapering proximad, not as elongately oval as in *S. frothinghami;* notogastral bristles a2 closer to a1 than to b1, bristles c2 slightly more remote than a1, b1, and b2.

Ventral aspect quite similar to *S. frothinghami.*

COTYPES: Twenty-four specimens with *S. frothinghami* but preferring the lowest part of the litter layer; slide 34F10.30p2.

Suctobelbella laxtoni sp. nov.

(Figures 28 to 30)

Color usually quite pale; size small, length 0.17 to 0.19 mm., breadth 0.09 to 0.1 mm.; abdomen high and broad; rostrum somewhat compressed so as to be narrower than anterior end of cephaloprothorax; edge of camerostome with three rather short and broad lacinia (figure 30); interpseudostigmatic ridges open mesad, forming a broad figure (figure 28); pseudostigmatic organ head compressed, dorsal edge with two or three rows of short, spiny

"bristles" (figures 28 and 29); notogastral bristles short, stout, stiff (not flexuous), a1 posteriad of mesal spur, a2 on transverse plane passing through b1 or only slightly anteriad, bristles c2 much more remote than b2; anal cover bristles both near lateral edge of cover.

HABITAT: Chiefly soil and lowest litter layer.

COTYPES: One hundred and seven specimens from Andropogon litter of a twenty year old-field grown to ten year old pines, Cook property, Avers Creek Township on Asheville-Brevard road, N. C.; taken February 25, 1935, slide 34F25.3–5, –6 and –8. The larger size is from the types.

Named for Miss Josephine Laxton of the Appalachian Forest Experiment Station.

Suctobelbella hurshi sp. nov.

(Figures 26 and 27)

DIAGNOSTIC CHARACTERS: Rostrum rounded, compressed, rostral bristles standing out at right angles; edge of camerostome with but one incision, thus forming only two rounded lobes (figure 27); pseudostigmatic organs quite similar to those of *Oppiella corrugata*, that is with fairly long cilia in one row, but with pedicel bent so as to direct head across prothorax; notogaster ovate, bristles medium long (figure 26), a1 more remote than lateral spurs, a2 on transverse plane passing near b1, c2 slightly more approximate than c1, thus having taken its place in the mesal row.

DESCRIPTION: Size medium, length 0.2 mm., breadth 0.1 mm.; cephaloprothorax quite typical; rostrum, in lateral aspect, low, with rounded dorsal outline; dorsal aspect of prothorax similar to that of *S.* (*S.*) *frothinghami* except that the interpseudostigmatic ridges are shaped roughly like a capital J without distinct crosspiece, the interlamellar bristle being inserted in the head (figure 26); notogastral spurs somewhat closer together; bristle a2 much nearer b1 than to a1 (figure 26); genital cover bristles 3 more approximate than 4. Easily recognized by the compression at base of rostrum and its peculiar shape.

HABITAT: Evidently a species of pasture sod.

COTYPES: Forty-two specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F120p4.

Named for Dr. Charles R. Hursh, Ecologist of the Appalachian Forest Experiment Station.

Eremulus cingulatus sp. nov.

Differs from *E. modestus* (6, p. 10; 7, Pl. 21, Fig. 79) in that the lamellar ridges are more remote, spanning the interlamellar bristles; there are no

pocks at base of cephaloprothorax; bristles a1, a2, b2 are well developed; the posterior edge of the post-thorax is indicated by a wavy line lined with areoles, the whole area being often raised (in lateral aspect) above the abdomen proper. Foreign matter coating the animal often hides this posterior edge of the post-thorax. Dimensions: length 0.36 mm.; breadth 0.19 mm.

Cotypes: Nine specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F11E.

Eremulus pectinatus sp. nov.

(Figure 8)

Differs from all described species by its strongly pectinate pseudostigmatic organs (figure 8). Dimensions: Length 0.25 mm., breadth 0.12 mm.

Cotypes: Fourteen specimens from surface soil and weeds of plowed land abandoned five years, Bent Creek area, ten miles southwest of Asheville, N. C.; slide 34F20.5.

Carabodes falcatus sp. nov.

(Figure 15)

Abdomen margined, shouldered, coarsely areolated, with translucent, clavate, appressed notogastral bristles; genital aperture distant from anal the length of genital; pseudostigmatic organs falcate, head pointed, linearly coarsely scabrate (figure 15); length 0.365 to 0.53 mm., breadth 0.2 to 0.3 mm.

Cotypes: Thirty-eight specimens from soil sample (including surface crumbles, that is the H layer) under eighty year old pine-oak woodland, Bent Creek Experimental Forest, Asheville basin, N. C.; slide 34F21.5.

Liacarus spiniger sp. nov.

Body oval, quite variable in size, length 0.49 to 0.68 mm., breadth 0.27 to 0.39 mm.; pseudostigmatic organs slenderly clavate, head subequal to pedicel, bearing a stout, burred spine nearly as long as head; distal end of lamellæ with corners drawn out as cats' ears, the mesal the longer; lamellar bristles stout, stiff, barbed, inserted on a slight swelling between the lamellar ears; interlamellar area produced as a cone; the two shoulder bristles shorter than spine of pseudostigmatic organs; notogastral bristles as long as diameter of tarsi and tibiæ I and II.

Cotypes: Twenty-nine specimens from same sample as the preceding; slide 34F21–27.

Closely related to *L. coracinus* (29, p. 152, fig. 214) but lamellæ with short blunt ears and shoulder bristles much longer.

Tectocepheus velatus 20, p. 189, Pl. 6

This species is represented by a subspecies in America. I say subspecies because the insertions of the rudimentary bristles are in the same position as in specimens from Regensburg (Bavaria).

In 1904 (4, p. 252) *T. minor* from Florence, Italy, was described as differing from the Italian *T. velatus* (3, fasc. 77/2) in having finer, more crowded granules, a less clavate pseudostigmatic organ and in being smaller (290 *versus* 350 microns long). The figures (9, Pl. 2, Fig. 31) show *T. minor* to have the same lamellæ as the Italian *T. velatus*. The pseudostigmatic organ head looks less clavate in some aspects or positions because the head is compressed not circular in cross-section. Furthermore this species is somewhat variable. Thus I do not regard *T. minor* as specifically distinct from *T. velatus*.

T. minor expansus (9, p. 422, Pl. 2, Fig. 32) is described as broader and shorter, cephaloprothorax longer and narrower, pseudostigmatic organs nearly twice as long, angle of pteromorphæ produced as a rounded angle, granules less dense than in the species. Type locality: North America. The figure (9, Pl. 2, Fig. 32) shows the distal ends of the lamellæ to be wider than in the species (*T. minor*) much resembling *T. v. sarekensis* (27, p. 517, Figs. 290–293). This Scandinavian form however has very different pteromorphae (27, Fig. 292). Thus the American form may be known as:

Tectocepheus velatus expansus comb. nov.

Differs from the species in having distal end of lamellæ broad, the bristle inserted on lateral edge; genital cover bristles 2, 3, and 4 (the three posterior bristles) subequally spaced while in Regensburg specimens bristles 3 and 4 are more widely spaced than 2 and 3. This is a normal condition, exceptions being present on both sides of the Atlantic.

In eastern America I find two marked forms which I will refer to as impressed and smooth. The impressed forms have a series of four fair sized impressions along each side of the notogaster. These are lacking in the smooth form. The impressions are plainly visible under magnification of twelve in dry material but

are invisible in mounted or alcoholic specimens. These two forms are further characterized by the following differences. The impressed have the pseudostigmatic organ head longer, more slender, the surface pebbled to nobby, the pedicel longer, sharply bent; notogastral bristles finer, pale, indistinct; notogastral pseudofissura distinct; surface without clean-cut granules but with flattened, smudgy, more widely spaced granules. This I take to be the true *T. v. expansus* because of the long pseudostigmatic organ and the more widely spaced granules. The unimpressed form has pseudostigmatic organ head shorter, broader, with surface strongly spiny, the pedicel shorter, nearly straight to gently curved; the notogastral bristles are larger, stouter, dark; the pseudofissura is indistinct; the surface has prominent, clean-cut granules.

These differences are not due to sex as individuals of both forms bear a maximum of two large eggs. Furthermore the two forms are not sharply segregated as to habitat, though one form or the other usually predominates. I therefore regard them as representing a dimorphic subspecies. I have not yet seen an American form with the pointed lamellæ of *T. velatus* as figured by Michael (21, p. 313, Pl. 21, Figs. 9–15). Specimens from one lot have two pairs of impressions on the anterior half of the notogaster, thus being quite intermediate in this characteristic.

Scheloribates muiricius sp. nov.

Similar to *Sch. lanceoliger* (6, p. 2) but pseudostigmatic organs resembling those of *Sch. muiri* (19, p. 53, pl. 8, figs. 69–79), adalar bristle close behind its porose area which is barred; posteriormost bristles of notogaster more remote, more remote than pair anterior to them, the porose area laterad; middle pair of sternal bristles at sides of slender sternum; length 0.4 to 0.44 mm.

Cotypes: Thirteen specimens from litter of isolated short-leaf pine stand, two miles southwest of Bent Creek, Asheville-Brevard road, N. C.; slide 34F10.2Sch.

This species is named after John Muir, seer of the Rockies. In general appearance, especially the pseudostigmatic organs, it resembles *Sch. muiri* which is named after the late Frederick Muir, formerly chief entomologist of the Experiment Station of the Hawaiian Sugar Planter's Association.

Xylobates oblonga robustior subsp. nov.

Pseudostigmatic organ head slender, the fringe formed of spinelike projections spaced half their length from each other; the number of elements to the fringe varies considerably either on the pedicel or on the head, there occasionally being some on the opposite edge; total length 0.47 to 0.51 mm., breadth 0.29 to 0.32 mm.

COTYPES: Thirty-seven specimens from upper inch of soil, eighty year old pine-oak woodland, Bent Creek Experimental Forest, northeast of laboratory buildings, Asheville basin, N. C.; slide no. 34F21–1.

Oribata oblonga (12, p. 73, Pl. 11, Fig. 37) was described from Columbia, Missouri. A year earlier *Protoribates capucinus* (6, p. 2) was described from Italy and Columbia, Missouri. As most American species found also in Italy differ at least subspecifically, *X. capucinus* must be restricted to Italy, Berlese not recognizing the subspecific difference. With this understanding I will use *X. oblonga* as representing the American species. The length of the Italian individual is given as 0.42 (average or maximum?, probably the latter); the length of *X. oblonga* is given as 0.44 (average or maximum?).

Peloribates curtipilus sp. nov.

Surface smooth; bristles short, nearly straight, stout, burred; pseudostigmatic organs clavate, with short pedicel, head finely barbed in about five rows; length 0.348 to 0.4 mm., breadth 0.238 to 0.26 mm.

COTYPES: Eleven specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F11.

Genus **Propelops** gen. nov.

Resembling Pelops in arrangement of notogastral bristles and porose areas, in development of pteromorphæ, lamellæ, pseudostigmatic organs, and tectopedia I and II, but differing in having normal mouthparts and unexpanded interlamellar bristles.

TYPE: *Propelops pinicus* sp. nov.

Propelops pinicus sp. nov.

Pseudostigmatic organs porect, clavate, slightly burred; interlamellar bristles very long, stout, slightly burred, extending anteriad and ventrad to end of rostrum; lamellar bristles inserted on under face of lamellæ, sharply

bent, extending mediad beyond rostrum; rostrum covered with rounded, rivet-headlike knobs; rostral bristles short, clavate, fimbriate along edge of head, inserted well back on lower edge of genæ; lamellæ very broad, with slender translamella, nodose (like rostrum); pteromorphæ with anterior edge above tectopedia II undulate, over cephaloprothorax gently convex; notogastral bristles short, stiff, smooth, except a closely spaced posterior pair which are clavate.

Cotypes: Twelve specimens from short-leaf pine litter of isolated stand two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F10.2P2.

Pelops brevipilus sp. nov.

"Eyed"; anterior edge of notogaster triundulate; interlamellar area deeply "excised"; rostrum compressed, slender; lamellar bristles large clavate, blunt; pseudostigmatic organs gently curved, half length of lamellar bristles, slenderly clavate; notogastral bristles short, inconspicuous, posterior edge of notogaster impressed along median line; length 0.34 mm., breadth 0.26 mm.

Cotypes: Thirty specimens from closely browsed Andropogon pasture between wooded slopes, two miles southwest of Bent Creek on Asheville-Brevard road, N. C.; slide 34F11P.

ANALYSIS OF THE FOREST FLOOR ARTHROPODS

Ivar Trägårdh's sensationally written paper (26) concerning my "Evaluation of the forest floor population" (19) cannot be considered as a contribution to scientific (that is impartial and unbiased) literature. I wish, however, to set forth certain facts which he did not trouble himself to secure. While in China I made two attempts to secure his paper of 1929 (25) but he failed to aid me. My paper was written the summer of 1932, and it was not until after the paper had gone to press that I actually saw a copy of his paper while at Ithaca. As it is an exception to those papers I reviewed, I see no reason why I should have included it, especially as it was a brief preliminary (?) paper.

In 1919 I first became interested in determining the exact habitats of Oribatid mites, and have been collecting forest floor material with that idea, carefully separating the various elements of the forest floor. This work I continued while in China. As Trägårdh knows, the analysis of such material is a long and tedious process—especially when each subfamily and even each

species has to be entirely revised (locally) and restudied before specific determinations can be made. A careful study of my habitat data (15, p. 267; 17, p 260) might have revealed this type of collecting. In brief I had not only gone over the European literature with care but had been carrying on fractional, analytical collecting of forest floor material for over ten years before writing as I did.

Trägårdh's own paper of 1929 corroborates my suggestions for future procedure. I have made certain practical suggestions. Trägårdh objects on the ground that it is too difficult (top of page 56). It is the scientist's duty to find a way, and he will. I placed the emphasis on qualitative as opposed to quantitative analysis. This is generally admitted to be a preferable objective. There is certainly no harm in reorienting any future American work along this line. Thus I do not see what axe Trägårdh has to grind except that I omitted considering his own brief contribution.

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For further details on the above references see my "Annotated Bibliography of the Moss Mites (Oribatoidea, Acarina)" and its appendices.

PLATE 26

Oppiella corrugata (from Regensburg)

Figure 1. Midthoracic region, showing ridge of anterior edge of notogaster; ratio × 330.

Oppiella corrugata squarrosa subsp. nov.

Figure 2. Same aspect; ratio × 330.

Oppiella corrugata apicalis subsp. nov.

Figure 3. Same aspect; ratio × 330.

Figure 4. Lateral aspect of prothoracic ridges and pseudostigmatic organ; ratio × 330.

Figures 5 & 7. Pseudostigmatic organ head, anterior aspect; ratio × 440.

Figure 6. Same, dorsal aspect to left of numeral, anterolateral aspect to right; ratio × 440.

Eremulus pectinatus sp. nov.

Figure 8. Pseudostigmatic organs; ratio × 440.

Oppiella foliosa sp. nov.

Figure 9. Dorso/ventral aspects, legs and mouth parts omitted; ratio × 330.

Figure 10. Pseudostigmatic organ, lateral aspect; the one to left of numeral partly cleaned off; ratio × 440.

Figure 11. Shoulder bristle; free hand.

Figure 12. Notogastral bristle, veining indicated; free hand.

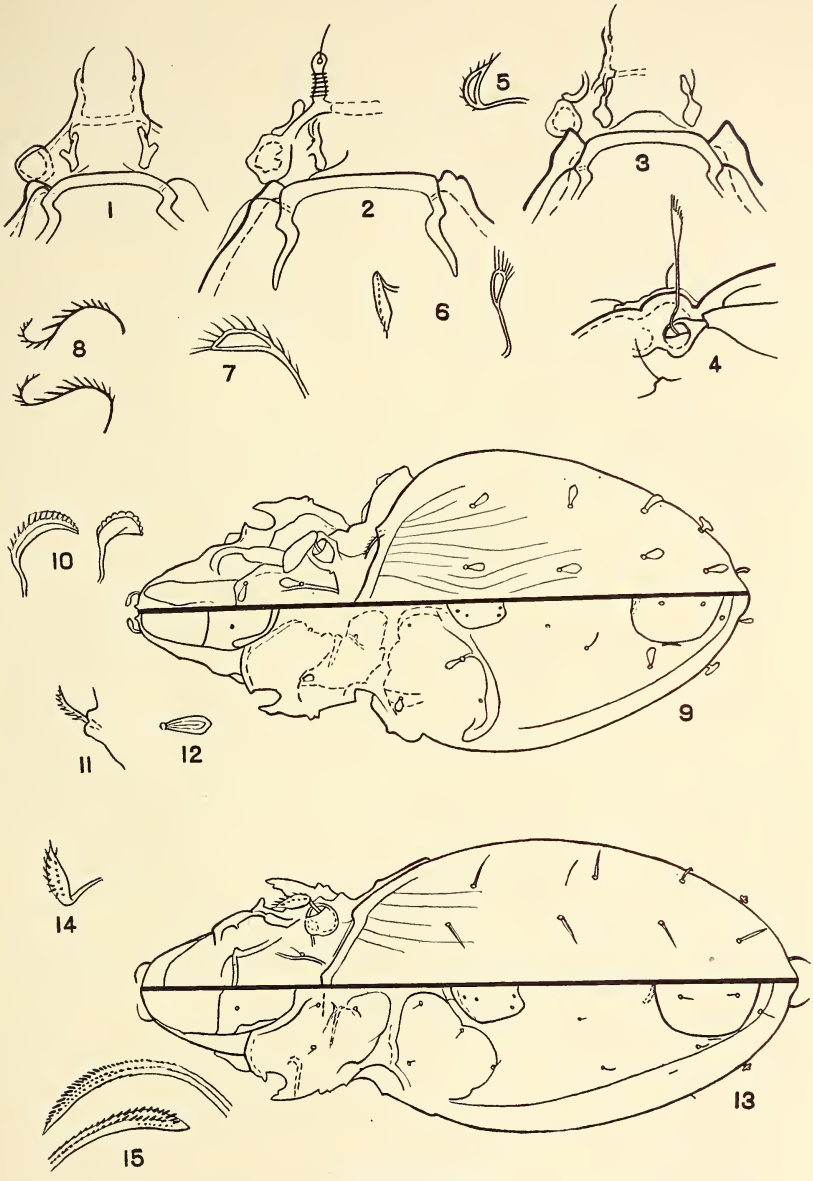
Oppiella stipularis sp. nov.

Figure 13. Dorso/ventral aspects, legs and mouth parts omitted; ratio × 330.

Figure 14. Pseudostigmatic organ, dorsal aspect; free hand.

Carabodes falcatus sp. nov.

Figure 15. Pseudostigmatic organs; ratio × 440.



MOSS-MITES

PLATE 27

Suctobelbella serratirostrum sp. nov.

Figure 16. Dorso/ventral aspects, legs and mouth parts omitted; ratio × 330.
Figure 17. Rostrum, lateral aspect; free hand.
Figure 18. Rostrum, posteroventral aspect; free hand.
Figure 19. Edge of camerostome, anterodorsal aspect; ratio × 440.
Figure 20. Pseudostigmatic organ, side view, showing the several rows of bristles; ratio × 440.

Suctobelbella longicuspis sp. nov.

Figure 21. Rostrum, dorsolateral aspect; ratio × 440.
Figure 22. Pseudostigmatic organs, figure to right of numeral is dorsal aspect, figure to left is somewhat lateral; free hand.

Suctobelbella frothinghami sp. nov.

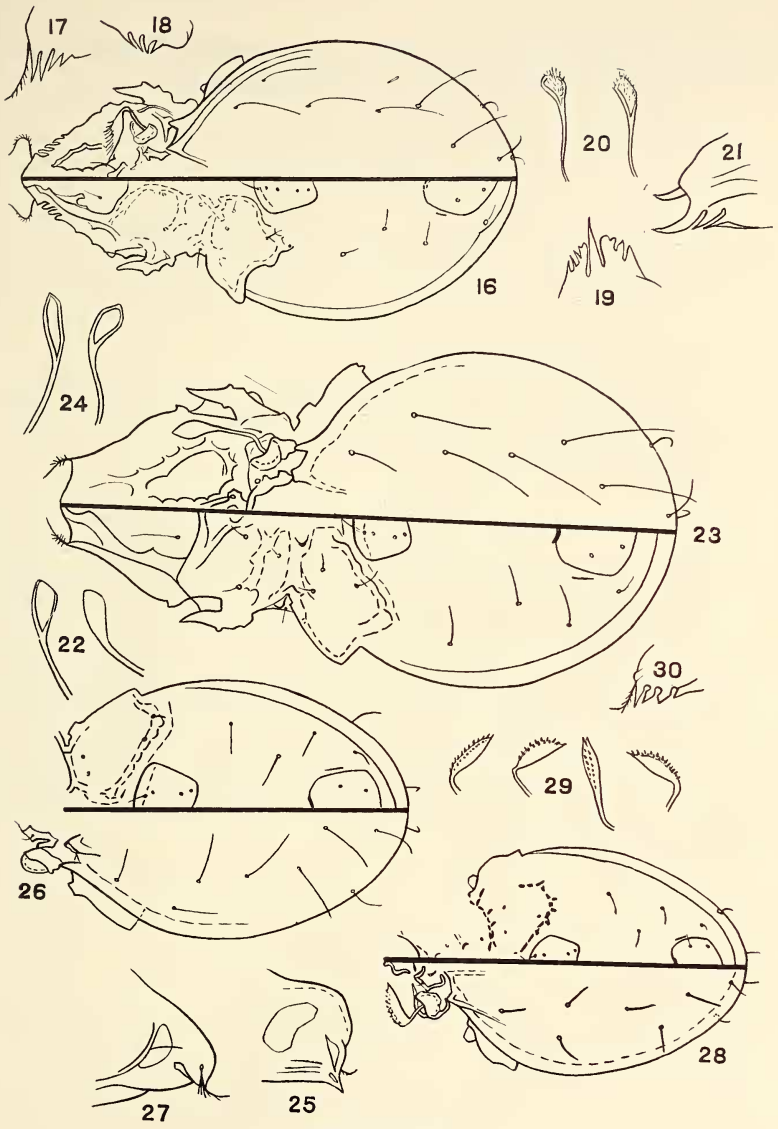
Figure 23. Dorso/ventral aspects, legs and mouth parts omitted; ratio × 330.
Figure 24. Pseudostigmatic organ, slender head to left of numeral, broad head to right; ratio × 440.
Figure 25. Rostrum, lateral aspect; ratio × 440.

Suctobelbella hurshi sp. nov.

Figure 26. Abdomen and part of prothorax, dorso/ventral aspects; ratio × 330.
Figure 27. Rostrum, lateral aspect; ratio × 440.

Suctobelbella laxtoni sp. nov.

Figure 28. Abdomen and part of prothorax, dorso/ventral aspects; ratio × 330.
Figure 29. Pseudostigmatic organs, dorsal aspects, except figure to right of numeral which is lateral aspect; ratio × 440.
Figure 30. Rostrum, lateral aspect; free hand.



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